FishEthoBase:
Short Profiles and FishEthoScore

RATIONALE

The main intent of FishEthoBase is to improve fish welfare by 1) assessing if and to which extent the practices in farming of a fish species satisfy the needs and behaviour patterns observed in the wild, and 2) providing recommendations for improvement to practitioners, based mainly on ethological findings from scientific research.

FishEthoBase is focussing on behaviour

Fish welfare depends on 3 types of factors: physiological, behavioural, and mental factors. In the FishEthoBase short profiles, we focus on 10 core criteria for behaviour**.** For other factors and criteria, we recommend

- Felicity Huntingford and Sunil Kadri (2014)[1]: "Defining, assessing and promoting the welfare of farmed fish" and
- Catarina I M Martins et al. (2011)[2]: "Behavioural indicators of welfare in farmed fish" that provides a checklist for farmers what to do if they want to improve welfare.

Short profile:
A sharp assessment of the welfare state and potential of a species

With the **short profiles**, we pursue two goals:

- To carry out a rapid evaluation of welfare of farmed fish by focussing on 10 crucial criteria, in order to cover ultimately all fish species farmed nowadays (ca 450). The short profiles aim to complement rather than replace the much deeper (and laborious) full profiles which will be continued in parallel.
- To enable a sharp assessment of 3 dimensions, following the well established **risk analysis** model:
  a) the **Likelihood** that the individuals of a species experience welfare under minimal farming conditions,
  b) the **Potential** to improve the welfare of the individuals of this species, and
  c) the **Certainty** of these findings.

FishEthoScore as an indicator for practice and science

The 3 dimensions are assessed and scored separately in each of the 10 criteria and summarised in the **FishEthoScore** (see page 3, Scoring Logic), indicating the overall extents of Likelihood, Potential and Certainty of a species' welfare.
For more detailed recommendations please go to our "Recommendations" page (a part of our **full profiles**) of the species in question, if available. Unfortunately however, for most of the species assessed in a short profile, we are not yet able to provide a full profile as it demands much more work.

The FishEthoScore of the various species may help to decide on which species one should best concentrate research, development, and investments in order to put the industry in a position to positively answer the upcoming fish welfare demands.

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[1] www.oie.int/doc/ged/D13671.PDF

[2] link.springer.com/article/10.1007%2Fs10695-011-9518-8

The problem of lacking data

Ideally we would have available sound evidence about what the individuals of a species need and would like to do. Thus we could a) address the gap between natural needs and behaviour and the farming conditions and b) indicate measures to narrow the gap.

In reality, we encounter much imponderability, mainly with regard to what we know about fishes in the wild:

For many species, observations are incomplete or do not exist at all.

When findings are available, we often do not know if a certain need or behaviour (e.g., home range) observed in the wild must be met or performed in any case or if the farming conditions (e.g., feed) may alter the reasons for this need or behaviour to a point where it is less or even no more necessary for the fish.

Third, we often lack information on the species' plasticity in response to its various natural needs (space, shelter, substrate, etc.) which would help to identify the limits of the species' adaptability to a farming system.

Three principle rules of prudence

We cope with the above uncertainties by means of three principle rules:

Robust observations in the wild are the gold standard and function as benchmark for artificial living conditions.

We openly admit what we do not know. In case of lacking findings, we state "NO DATA FOUND YET", whereas with contradictory or insufficient findings we state "further research needed".

***In dubio pro reo:* in case of doubt in favour of the fish.** When robust observation is lacking, we assume that the fish is not experiencing welfare. Here, it is the farmer's burden to verify that his fishes are well. Within the frame of this "polluter pays principle", the role of FishEthoBase is to provide the scientific groundwork on which the industry can improve the rearing conditions.

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SCORING LOGIC

Likelihood (Li)

Definition: Measure for the likelihood that the individuals of the species concerned experience high welfare under minimal farming conditions.

Scores: H=High, L=Low, and ?=unclear

Scoring rules:

Li=H	There is a high likelihood of welfare under minimal farming conditions given the findings in the wild.
Li=L	There is a low likelihood of welfare under minimal farming conditions given the findings in the wild.
Li=?	There are no findings from wildlife and/or from minimal farming conditions available, or the findings are contradictory.

Potential (Po)

Definition: Measure of the probability to improve fish welfare regarding
a) the species' potential for experiencing more welfare, given its necessities and characteristics,
and b) the potential for the development and application of better farming systems for this species.

Scores: H=High, M=Medium, L=Low, and ?=unclear

Scoring rules:

Po=H	There is a high potential a) of the species for experiencing more welfare under other farming conditions and b) for farming systems to be improved correspondingly, proven by successful improvements on the same or closely related species.
Po=M	There is a medium potential for improvements, but problems or doubts remain (e.g. farming systems successfully applied on less related species have not yet been applied on this species).
Po=L	There is a low potential of improvement, be it due to the specific requirements of the species vs. engineering limits or due to the lack of the feasibility of improving farming systems.
Po=?	• No findings or contradictory findings. • In cases where Li=H when indications of possible further improvement are lacking.

Certainty (Ce)

Definition: Measure of the certainty of the findings for and assessments of Likelihood **and** Potential.

Scores: H=High, M=Medium, L=Low, and ?=unclear

Scoring rules:

Ce=H	We are highly certain of our assessment of Likelihood and of Potential.
Ce=M	There is some certainty in our assessment of Likelihood and/or of Potential.
Ce=L	There is only low certainty due to contradictory findings for Likelihood and/or of Potential.
Ce=?	Certainty cannot be scored due to lack of data for Likelihood or Potential.

Construction of the FishEthoScore

The FishEthoScore provides a rough measure to be compared across all assessed species. The scoring is the result of the ratings provided by a group of experts, as it is common in such risk analyses.

We are careful enough to understand our data as representing an ordinal scale. And because the dimensions express more than two values (H/M/L), we refrain from calculating arithmetic means.

Instead, within each of the 3 dimensions, we sum up only the criteria scoring “High”. Consequently, the FishEthoScore consists of 3 figures, one each for Li, Po, and Ce. Transparency in the construction of the FishEthoScore is provided by the table at the top of each short profile and by the systematic exposition of the findings for each criterion.

We weigh all criteria equally. Attributing more weight to some criteria (to which ones?) would be arbitrary either way. Moreover, weighing would have to be established individually for each species to encompass its specific problems under farming conditions. Consequently it would be impossible to compare the results across the species.

Our scoring of the criteria is transparent and can be traced back to the references by yourself in order to make up you own evaluation.

Continuous joint progress in support of fish welfare

We understand FishEthoBase as a database in continuous progress in support of all stakeholders who want to improve the welfare of farmed fish, yielding valid indications for scientists on research gaps and to farmers on best decisions for the welfare of their fishes.

We warmly welcome any comment or amendment. If you know a study or an observation that would enrich or improve our profile of a species, please send an e-mail to ethology@fair-fish.net and contribute. We will be able to read your feedback in EN, DE, FR, IT, ES or PT.